CLAIMS

1. Stopper capsule (1) designed as a screw stopper for a container typically designed to contain alcoholic drinks, and typically a bottle in which the neck (2) is provided with an outer thread (20) and a tamper-evident ring (21), comprising two parts fixed together in rotation and axially by an assembly means, a) an inner part or insert (3) with height h, made of plastic material, comprising a so-called inner head (30) and a so-called inner skirt (31), the said inner skirt (31) comprising an inner thread (32) on its inside surface designed to cooperate with the thread (20) of the said neck so as to be able to screw the said capsule to the said neck (2) along a rotation axis or an axial direction (10), and b) an outer part or shell (4) with height H, typically metallic or metal based, comprising an outer head (40) and an outer skirt (41) masking all or part of the said inner skirt (31) facing it, the said capsule typically being provided with a sealing means (5), a tamper-evident means (6) and a first opening means (7), **and characterised in that:**

1) the said outer skirt (41) of the said shell (4) comprises at least a typically cylindrical part (42) with height H1, diameter D1 adapted to the said neck (2), and at least a radially expanded part (43) with height H2, inscribed in a circle with diameter D2 > D1 and forming an annular radial cavity (48), the said typically cylindrical part (42) of the said shell (4) radially clamping the said inner skirt (31) of the said insert like a hoop at least facing the said inner

thread (32), the said expanded part (43) being designed particularly to facilitate manual gripping of the said capsule (1) and rotation of the capsule with respect to the said neck (2) to open / close the said container by unscrewing / screwing the said capsule (1) on the said neck (2),

2) the said radially expanded part (43) and the said typically cylindrical part (42) of the said outer skirt (41) typically have the same thickness Ep.

2. Capsule according to claim 1 in which the said expanded part (43) typically forms an annular, continuous or discontinuous ring, its upper part typically being connected to the said outer head (40) or possibly to the said cylindrical part (42), and its lower part being connected to the said cylindrical part (42).

3. Capsule according to either of claims 1 or 2 in which all or part of the said inner skirt (31) of the said insert (3) cooperates with all or part of the said typically cylindrical part (42) of the said outer skirt (41), particularly so as to form the said assembly means.

4. Capsule according to any one of claims 1 to 3 in which all or part of the said inner head (30) of the said insert (3) is facing the said expanded part (43) of the said shell (4).

5. Capsule according to any one of claims 1 to 4 in which the said height H2 of the said radially expanded part (43) is at least 2 mm and typically varies from 3 to 15 mm.

6. Capsule according to any one of claims 1 to 5 in which the said diameter D1 varies from 15 mm to 60 mm.

7. Capsule according to any one of claims 1 to 6 in which the D2/D1 ratio varies from 1.02 to 1.15 and typically from 1.05 to 1.10.

8. Capsule according to any one of claims 1 to 7 in which the said typically cylindrical part (42) and the said expanded part (43) are connected by at least one intermediate part with an average slope equal to $\Delta D/\Delta H$, where ΔD is equal to D2 - D1 and ΔH is equal to the height of the said shell (4) on which the said diameter varies from D1 to D2, the said slope typically varying from 0.5 to 2 and preferably from 0.8 to 1.5.

9. Capsule according to any one of claims 1 to 8 in which the said radially expanded part (43) and the said typically cylindrical part (42) are connected together by a radius of curvature R2 varying from 1.5 mm to $\Delta D/2$.

10. Capsule according to any one of claims 1 to 9 in which the said expanded part (43) is adjacent to the said outer head (40) in its upper part, and to the said cylindrical part (42) of the said outer skirt (41) in its lower part, the said outer head (40) and the said expanded part (43) being connected by a radius of curvature R1 varying from 1.5 mm to 5 mm.

11. Capsule according to any one of claims 1 to 10 in which the upper part and lower part of the said expanded part (43) is adjacent to the said cylindrical part (42) of the said outer skirt (41), the said

expanded skirt (43) being an expanded skirt (43') at a spacing from or offset from the said outer head (40).

12. Capsule according to any one of claims 1 to 11 in which the said inner head (30) of the said insert (3) is facing all or part of the said expanded part (43, 43'), so that the inner thread (32) of the said inner threaded skirt (31) of the said insert (3) is facing the said cylindrical part (42) of the said outer skirt (41).

13. Capsule according to any one of claims 1 to 12 in which the said inner head (30) of the said insert (3) comprises an arch (33) in contact with the said sealing means (5) and a recessed spacing means (34) above the said arch, typically formed from spaced concentric rings (340) in contact with the said outer head (40).

14. Capsule according to any one of claims 1 to 13 in which when the said capsule (1) seals the said neck (2) by screwing, the axial height of the said expanded part (43) is such that it is above the said outer thread (20) of the said neck (2) and possibly above the said locking ring (22) of the said neck (2).

15. Capsule according to any one of claims 1 to 14 in which the thickness of the said inner skirt (31) of the said insert (3) at the bottom of the groove varies between 0.1 mm and 0.5 mm.

16. Capsule according to any one of claims 1 to 15 in which the said insert (3) is an insert (3') for which the inner skirt (31) is said to be "short", the said insert having a height h1 typically varying from 6 mm to 20 mm, the said height h1 typically

corresponding to the height of the said neck from the said locking ring (22) as far as the bottom of the said outer thread (21).

17. Capsule according to claim 16 in which the ratio H/h1 may vary from 1.1 to 4 and preferably from 2 to 3.

18. Capsule according to any one of claims 1 to 17 in which the said outer skirt (41) includes the said tamper-evident means (6), the said outer skirt (41) being capable of forming a crimped zone (60) under the said tamper-evident ring (21), and the said first opening means (7), the said outer skirt (41) comprising a line of weakness (70) fixing a guarantee strip (71) above the said line of weakness by narrow connecting strips, and capable of forming the said crimped zone.

19. Capsule according to any one of claims 1 to 15 in which the said insert (3) is an insert (3") for which the inner skirt (31) is said to be "long", the said insert having a height h2 typically varying from 20 mm to 50 mm, the said height h2 typically corresponding to the height of the said neck from the said locking ring (22) as far as the bottom of the said tamper-evident ring (21) of the said neck (2), the ratio H/h2 typically varying from 0.8 to 1.1.

20. Capsule according to any one of claims 1 to 15 in which the said insert (3) is an insert (3'") in which the inner skirt (31) is said to be "very long", the said neck comprising a lower tamper-evident ring (21'), the said insert having a height h3 more than 50 mm, the said height h3 typically corresponding to the height of the said neck from the said locking ring

(22) as far as the bottom of the said lower tamper-evident ring (21'), the ratio H/h2 typically varying from 0.8 to 1.1.

21. Capsule according to any one of claims 19 to 20 in which the said inner skirt (31) includes the said tamper-evident means (6) and the said first opening means (7), the said inner skirt (31) comprising a guarantee strip (71) in its lower part connected by a line of weakness (70) provided with several narrow connecting strips, the said guarantee strip (71) cooperating with the said tamper evident ring (21) by means of attachment tabs (61), so that the said tamper-evident ring (21) blocks the said tabs (61) and the said guarantee strip (71) in the axial direction, and thus first opening of the said capsule causes a visible rupture of the said narrow connecting strips along the said line of weakness (70).

22. Capsule according to any one of claims 19 to 21 in which the said guarantee strip (71) comprises an outer projection (62) forming a rim for the said outer skirt, typically a stop rim with a width varying from 0.5 to 5 times the thickness Ep of the said outer skirt (41).

23. Capsule according to either of claims 21 or 22 in which the said attachment tabs (61) are connected to the said guarantee strip (71) or possibly to the said outer projection (62).

24. Capsule according to claim 23 in which each of the said attachment tabs (61) is fixed to the said guarantee strip (71) or to the said projection (62) by

a thinned part (610) of the said tab (61) making it flexible.

25. Capsule according to any one of claims 21 to 24 in which the said line of weakness (70) is a notched line (70') so as to avoid any unwanted breakage of the narrow connecting strips, particularly during the said sealing or capping of the said container.

26. Capsule according to any one of claims 1 to 25 in which the said expanded part (43) has a profile typically forming a circle or a regular polygon, typically with N sides where N varies from 5 to 18 and preferably from 6 to 12 sides, over all or part of its height H2.

27. Capsule according to any one of claims 1 to 25 in which the said outer skirt (41) forms a surface of revolution over all or part of its height H, with a constant or variable radius depending on the height considered, or has a symmetry of rotation with angle 360°/N where H varies from 4 to 80, the said outer skirt (41) typically forming a plurality of N notches so as to facilitate manual gripping and rotation of the said capsule.

28. Capsule according to any one of claims 1 to 27 in which the said assembly means fixing the said inner part (3) and outer part (4) in rotation and axially comprises a mechanical or chemical anchor means, typically by gluing the said inner part (3) and outer part (4).

29. Capsule according to claim 28 in which the said inner skirt (31) cooperates with the said cylindrical part (42) facing it, over all or part of

the said height h, due to an adhesive layer fixing the said inner skirt (31) and the said cylindrical part (42).

30. Capsule according to any one of claims 1 to 29 in which the said outer part or shell (4) is made of aluminium, tin or a metalloplastic multi-layer material with a deformation under stress similar to the deformation of aluminium or tin.

31. Capsule according to claim 30 in which the said outer part (4) is made of aluminium treated on the surface, typically brushed or anodised, to create a "metallic" appearance or colour.

32. Capsule according to any one of claims 1 to 31 in which the said inner part (3) may be an insert moulded from a thermoplastic material, typically PE, PP, PET, SEBS or PS, possibly comprising one or several mineral fillers and typically talc.

33. Capsule according to any one of claims 1 to 32 in which the said sealing means (5) typically comprises an add-on seal (50) or a sealing insert (51), or possibly a circular sealing lip.

34. Capsule according to claim 33 in which the said sealing means (5) comprises the said add-on seal (50) with a sufficiently large diameter to at least cover the locking ring (22) of the neck (2) and a compression means, carried by the inner surface of the said insert, to apply the said seal (50) to seal the said neck (2) during the said capping and typically on the locking ring (22) of the said neck (2).

35. Capsule according to claim 34 in which the said compression means is composed of or comprises an

axial compression means, the said axial compression means typically comprising a rib or an annular overthickness (300) formed on the inner wall of the said inner head (30) or the said inner skirt (31), and designed to compress the said add-on seal (50) along the said axial direction (10) on the upper part (220) of the said locking ring (22), part typically plane or inclined by up to 45°.

36. Capsule according to any one of claims 34 to 35 in which the said compression means comprises a radial compression means, the add-on seal (50) being compressed onto the said neck along a radial direction (11) due to the said annular tab (311), the said radial direction (11) forming an angle of at least 45° with the said axial direction (10).

37. Capsule according to claim 36 in which the said radial compression means comprises an annular overthickness (300) typically formed at the junction between the said inner head (30) and the said inner skirt (31), and designed to compress the said seal (50) over all or part of the striated part (220) and / or on the typically vertical part of the locking ring (22).

38. Capsule according to claim 37 in which the said annular overthickness (300) is in the form of a step formed at the inner junction of the inner head (30) and the inner skirt (31) so as to compress the said seal (50) in the radial direction.

39. Capsule according to any one of claims 36 to 38 in which the said radial compression means comprises a chamfer (301) of the said insert (3) at the inner junction of the inner head (30) and the inner skirt

(31), the said chamfer (301) having a curvature typically similar to that of the striated part (220) of the said locking ring (22) facing it.

40. Capsule according to any one of claims 34 to 39 in which the thickness Ej of the seal, typically between 0.5 and 2.5 mm, is chosen particularly as a function of the radial space Eo between the said neck and the said capsule, such that the said container is capped and sealed by the said capsule, the thickness of the locally compressed seal or the distance E between the end of the said compression means and the said locking ring then typically being between 0.3 x Ej and 0.7 x Ej, where Ej.

41. Capsule according to any one of claims 36 to 40 in which the said radial compression means comprises an annular tab (311) formed on the inner wall of the said inner skirt (31) of the insert (3).

42. Capsule according to any one of claims 34 to 41 in which the said compression means comprises an axial compression means and a radial compression means, the said axial and / or radial compression means forming an integral part of the said insert (3) or forming an add-on part.

43. Capsule according to any one of claims 33 to 42 in which the said inner skirt (31) comprises a rib or a plurality of holding pins (310) capable of fixing the said add-on seal (50) to the said insert (3).

44. Capsule according to any one of claims 1 to 43 in which a spout (8) and / or a so-called "anti-fill" device (8') is fixed reversibly to the said insert (3) or possibly to the said sealing means (5, 50, 51),

typically due to an inner ring (35) of the said insert (3) temporarily cooperating with a peripheral skirt of the said spout (8) and / or the said anti-fill device (8').

45. Capsule according to any one of claims 1 to 44 in which the said insert (3) comprises an axial snap-on means, typically in the form of a plurality of flexible annular tabs (302) cooperating with the said radially expanded part (43) so as to fix the said insert (3) into the said shell (4) along the axial direction and so as to further increase the shock resistance of the said expanded part (43) of the said shell (4).

46. Capsule according to any one of claims 1 to 44 in which the said annular radial cavity (48) is filled with a material (49), typically an adhesive material, so as to simultaneously fix the insert to the said shell and to obtain a very high shock resistance for the said expanded part (43).

47. Capsule according to any one of claims 1 to 46 in which the said radially expanded part (43) has a non-circular section in a plane perpendicular to the said axial direction (10) so as to facilitate gripping and manual rotation of the said capsule (1).

48. Stopper capsule (1) designed for screw capping of a container typically designed to contain alcoholic drinks, typically a bottle with a neck (2) provided with an outer screwing thread (20)and a tamper-evident ring (21), comprising an outer part or shell (4) with height H, typically metallic or metal based, comprising an outer head (40) and an outer skirt (41) concealing all or part of the said inner skirt (31) facing it, the

said capsule being provided with a sealing means (5), a tamper-evident means (6) and a first opening means (7), and characterised in that the said outer skirt (41) of the said shell (4) comprises at least a typically cylindrical part (42) with height H1, diameter D1 adapted to the said neck (2), and at least one radially expanded part (43) with height H2, inscribed in a circle with diameter D2 > D1 and forming an annular radial cavity (48), the said expanded part (43) being designed particularly to facilitate manual gripping of the said capsule (1) and rotation of the capsule with respect to the said neck (2) to open / close the said container by unscrewing / screwing the said capsule (1) on the said neck (2).

49. Method for manufacturing capsules (1) according to any one of claims 1 to 48 in which:

a) the said inner part or insert (3) is possibly procured, possibly including the said add-on seal, and possibly the said spout or the "anti-fill" device (8, 8'),

b) a blank (4') of the said outer part (4) is formed, the said blank (4') comprising a skirt (41') with diameter D1 and height H' > H, typically by drawing, extrusion or spinning, starting from a typically metallic strip material,

c) the said blank (4') is transformed into the said outer part (4) by making a local radial expansion of the said outer skirt (41') over the said height H2,

d) the said add-on seal (50) and / or the said inner part (3) is / are possibly assembled to the said outer part (4), typically by deposition of an adhesive

onto the said cylindrical part (42) between it and the said outer skirt (41), and then force fitting the said inner part (31) into the said outer part (41).

50. Method according to claim 49 in which, in step c, the said local radial expansion is obtained by axial compression of an expandable punch (95) in the said blank (4') placed in a shaping die (91, 91') forming a radial cavity (92) with a profile similar to the profile of the said expanded part (43), the said expandable punch (95) forcing a part of the said outer skirt (41') radially into contact with the said inner wall of the said radial cavity (92), due to the said axial compression, typically obtained by axial displacement of a slide (96).

51. Method according to claim 50 in which the said local radial expansion is an expansion progressively extending in the axial direction, the said expandable punch starting to apply its action at the bottom part (45) of the said blank (4') closest to the said outer head (40), then progressively continuing to exert its action by moving away from the said outer head (40), so as to enable free creep of the said outer skirt (41') in the said cavity (92), the said free creep being made possible by progressive blocking of the said skirt (41') from the said outer head (40), the remainder of the said skirt (41') not being blocked in contact with the said die (91') by the said expandable punch (95), so as to progressively form the said expanded part (43) in the axial direction without any risk of metal breakage.

52. Method according to claim 51 in which the said expandable punch (95) has an axial profile (950) adapted to obtaining the said progressive expansion by radial compression.

53. Method according to any one of claims 50 to 52 in which the said expandable punch is formed from an elastomer material capable of deforming under the said radial compression, the said elastomer material having a Shore hardness chosen as a function of the mechanical characteristics of the said material from which the said blank (4') is made, typically metallic, the said hardness being greater than a given value depending on the mechanical characteristics and the thickness of the said material forming the said skirt (41'), such that the said axial compression develops a radial force of the said elastomer material greater than the local resistance of the said skirt (41') to deformation by radial expansion.

54. Method according to any one of claims 50 to 53 in which the said slide (96) is metallic or made from an elastomer with hardness greater than the hardness of the expandable punch (95), or it comprises an elastomer or rubber lower part (96') with a Shore A hardness greater than the hardness of the said expandable punch (95).

55. Method according to any one of claims 50 to 54 in which the said slide (96) has a shoulder (960) with a width equal to at least the said thickness Ep, so that the said shoulder can apply an axial compression on the end of the said outer skirt (41) when the said slide (96) is at its bottom dead centre, and thus

facilitate the said expanded part (43) being forced into contact with the wall of the said cavity (92).